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						SEAL	ED BID (I	FB)			NO.			
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7. ISSI PR (JED BY OCUR	RING CONTRACTIN	G OFFICER	Code 3235 N68	8892	8. ADI	DRESS O	FFER TO <i>(If other</i>	than Item	17)				
		RESEARCH LABOR		i, code 5255										
		MENT OF THE NA												
STE	INNI	S SPACE CENTER, 1	MS 39529-50	004										
NOTE	: In seal	led bid solicitations "offer" and "	offeror" mean "bid	" and "bidder".		<u> </u>								
					SOLICI	TATIC	N							
9. Se	aled of	fers in original and $_$ $^{\perp}$ - 10 ,	11 copies for fu	rnishing the supplies	or services i	in the	Schedu	ule will be receiv	ed at the p	olace specified	l in Item 8, c	or if		
		ed, in the depository located			, RM 46			until	<u>4:30</u> ю		5 Mar 20			
								,	Hour)		(Date)			
CAUTI	DN - LATI	E Submissions, Modifications, and Wi	ithdrawals: See Section	on L, Provision No. 52.214-7	7 or 52.215-10	. All of	fers are s	subject to all terms a	nd conditions	contained in this	solicitation.			
10. FC	R INFO	RMATION A. NAM	IE					B. TELEPHONE NO). (Include	area code) (NO COLLE	CT CAL	LS)	
	CALL			Eric J. Sogard						(228)68			,	
					11. TABLE O	F CON	TENTS							
(4)	SEC.		DESCRIPTION	7819	PAGE(S)	(~)	SEC.			DESCRIPTION				PAGE(S)
		T	I - THE SCHEDULE		T 4			T		I - CONTRACT CL	AUSES			
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÷	C	DESCRIPTION/SPECS./WORK		11.11.11.11.	3	×	IJ	LIST OF ATTAC		IMENTS, EXHIBIT	S AND UTHEK	ATTACH.		16
$\stackrel{\sim}{\times}$	D	PACKAGING AND MARKING	OTA TEMELOT	7	3	广				SENTATIONS AND	INSTRUCTION	NS		10
X	E	INSPECTION AND ACCEPTAN	ICE		3	U	l	REPRESENTAT						
X	F	DELIVERIES OR PERFORMANO	CE		4-5	×	K	OTHER STATEM			-			17
X	G	CONTRACT ADMINISTRATION			6-9	X	L	INSTRS., COND	S., AND NO	OTICES TO OFFE	RORS			18-23
×	Н	SPECIAL CONTRACT REQUIR	EMENTS		10-11	X	M	EVALUATION F	ACTORS FO	R AWARD				24-25
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C	fferor)	iance with the above, the under from the date for receipt of off	ers specified above	nis offer is accepted wit e, to furnish any or all ite	ının ems upon whic	ch pric	es are o	calendar days <i>(60</i> ffered at the price	<i>r catenaar</i> : set opposit	r <i>aays untess</i> te each item, del	<i>a different</i> livered at the	<i>period i</i> designated	<i>s inserte</i> l point(s),	<i>ed by th</i> within th
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	AND					OFFER (Type or print)								
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Z6. NA	ME OF C	ONTRACTING OFFICER (Type or p	print)			27. UN	III ED ST	ATES OF AMERICA				28. AWARI	DATE	
								(Signature of	Contracti	ing Officer				
IMPOI	RTANT -	Award will be made on this Form	m, or on Standard F	orm 26, or by other auth	norized officia	l writt	en notic			O Specif		L		

PART I - THE SCHEDULE SECTION B SUPPLIES OR SERVICES AND PRICES/COSTS

B-1 SUPPLIES/SERVICES AND COSTS

ITEM NUMBER	SUPPLIES/SERVICES	ESTIMATED COST	FIXED FEE	ESTIMATED COST PLUS FIXED FEE			
0001	The Contractor shall provide all personnel and facilities for performance of the work as described in Section C.	\$	\$	\$			
0001AA	1 Prototype Stabilization Unit	* NSP	* NSP	* NSP			
00017B1	2 Stabilization Units	* NSP	* NSP	* NSP			
0001AC	1 Motion-mount Rig	* NSP	* NSP	* NSP			
0002	Data in accordance with Exhibit A (DD 1423)	* NSP	* NSP	* NSP			
OPTION							
0003	5 Stabilization Units	\$	\$	\$			
0004	8 Stabilization Units	\$	\$	\$			
0005	1 Three-axis Pointer Tracker	\$	\$	\$			
0006	1 Three-axis Pointer Tracker	\$	\$	\$			
0007	1 Three-axis Pointer Tracker	\$	\$	\$			
8000	1 Three-axis Pointer Tracker	\$	\$	\$			
TOTAL EST	TOTAL ESTIMATED COST						
	XED FEE parately Priced	\$	\$	\$			

^{*} Not Separately Priced

SECTION C DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK

C-1 STATEMENT OF WORK

The work and services to be performed hereunder shall be subject to the requirements and standards contained in Attachment (1), Statement of Work, with Exhibit A, Contract Data Requirements List, and all other Attachments cited in Section J, which are incorporated by reference into Section C.

C-2 SUBCONTRACTING PLAN	N	
Subcontracting Plan	dated	is hereby incorporated by reference and
made a material part of this contract.		
(*this provision will	be included and compl	leted at time of award, if applicable)

SECTION D PACKAGING AND MARKING

D-1 PACKAGING AND MARKING

Preservation, packaging, packing and marking of all deliverable contract line items must conform to normal commercial packing standards to assure safe delivery at destination.

SECTION E INSPECTION AND ACCEPTANCE

E-1 INSPECTION AND ACCEPTANCE CLAUSES INCORPORATED BY REFERENCE

FAR CLAUSE TITLE

52.246-3 - Inspection Of Supplies- Cost Reimbursement (MAR 2001)
 52.246-5 - Inspection Of Services - Cost Reimbursement (APR 1984)

DFARS CLAUSE TITLE

252.246-7000 - Material Inspection And Receiving Report (DEC 1991)

E-2 INSPECTION AND ACCEPTANCE

Inspection and acceptance of the final delivery will be accomplished by the Technical Manager (TM) or Contracting Officer Representative (COR) designated in Section G of this contract. Inspection and acceptance will be performed at the Naval Research Laboratory, Washington DC 20375-5320.

SECTION F DELIVERIES OR PERFORMANCE

F-1 DELIVERIES OR PERFORMANCE CLAUSES INCORPORATED BY REFERENCE:

FAR CLAUSE TITLE

52.242-15 - Stop-Work Order (AUG 1989) - Alternate I (APR 1984)

52.247-34 - F.O.B. Destination (NOV 1991)

F-2 PERIOD AND PLACE OF PERFORMANCE

(a) The work under this contract shall commence on date of award and be completed no later than fifteen (15) months thereafter.

(b) The principal place of performance of this contract shall be the contractor's facility.

F-3 FAR 52.211-8 - TIME OF DELIVERY (JUN 1997)

(a) The Government requires delivery to be made according to the following schedule:

REQUIRED DELIVERY SCHEDULE					
Item No.	Quantity	Within Months after Contract Award or Exercise of Option(s)			
0001AA	1	13			
0001AB	2	15			
0002	1	13			
0003	5	12			
0004	8	12			

The Government will evaluate equally, as regards time of delivery, offers that propose delivery of each quantity within the applicable delivery period specified above. Offers that propose delivery that will not clearly fall within the applicable required delivery period specified above, will be considered nonresponsive and rejected. The Government reserves the right to award under either the required delivery schedule or the proposed delivery schedule, when an offeror offers an earlier delivery schedule than required above. If the offeror proposes no other delivery schedule, the required delivery schedule above will apply.

	OFFEROR'S PROPOSED DE	LIVERY SCHEDULE
Item No.	Quantity	Within Months after Contract Award or Exercise of Option(s)
0001AA	1	
0001AB	2	
0002	1	
0003	5	
0004	8	

(b) Attention is directed to the Contract Award provision of the solicitation that provides that a written award or acceptance of offer mailed, or otherwise furnished to the successful offeror, results in a binding contract. The Government will mail or otherwise furnish to the offeror an award or notice of award not later than the day award is dated. Therefore, the offeror should compute the time available for performance beginning with the actual date of award, rather than the date the written notice of award is received from the Contracting Officer through the ordinary mails. However, the Government will evaluate an offer that proposes delivery based on the Contractor's date of receipt of the contract or notice of award by adding (i) five calendar days for delivery of the award through the ordinary mails or (ii) one working day if the solicitation states that the contract or notice of award will be transmitted electronically. (The term "working day" excludes weekends and U.S. Federal holidays.) If, as so computed, the offered delivery date is later than the required delivery date, the offer will be considered nonresponsive and rejected.

F-4 PLACE OF DELIVERY - FOB DESTINATION

The contractor shall deliver supplies, all transportation charges paid, to destination in accordance with the clause in Section F of the Schedule titled FAR 52.247-34 FOB Destination (NOV 1991).

Receiving Officer

Naval Research Laboratory

Contract Number *

ATTN: *
CODE: *

LOCATION: *

Bldg. 49

4555 Overlook Avenue, SW Washington DC 20375-5320

(* To be filled in at time of award.)

SECTION G CONTRACT ADMINISTRATION DATA

G-1 PROCURING OFFICE REPRESENTATIVE

In order to expedite administration of the contract, the Administrative Contracting Officer (ACO) will direct inquiries to the appropriate office listed below. Please do not direct routine inquiries to the person listed in Item 20A on Standard Form 26.

Contract Matters- *					
Security Matters- *					
Safety Matters- *					
Patent Matters- *					
Release of Data- *					

The ACO will forward invention disclosures and reports directly to the Associate Counsel for Patents, Code 1008.2, Naval Research Laboratory, Washington DC 20375-5320. The Associate Counsel for Patents will return the reports along with a recommendation to the Administrative Contracting Officer. The Associate Counsel for Patents will represent the Contracting Officer with regard to invention reporting matters arising under this contract.

(* To be completed at time of award)

G-2 CONTRACTING OFFICER'S REPRESENTATIVE (COR) - FUNCTIONS AND LIMITATIONS

* is hereby designated the cognizant COR who will represent the Contracting Officer in the administration of technical details within the scope of this contract and inspection and acceptance. The COR is not otherwise authorized to make any representations or commitments of any kind on behalf of the Contracting Officer or the Government. The COR does not have the authority to alter the Contractor's obligations or change the specifications in the contract. If, as a result of technical discussions, it is desirable to alter contract obligations or statements of work, a modification must be issued in writing and signed by the Contracting Officer. The COR is responsible for reviewing the bills and charges submitted by the Contractor and informing the ACO of areas where exceptions are to be taken.

(* To be completed at time of award)

G-3 CONTRACTOR-ACQUIRED PROPERTY

(a) The contractor is authorized to acquire the following items of facilities which are needed to accomplish this contract.

Items to be Acquired

Estimated Cost

*

(*this provision will be included and completed at time of award, if applicable)

- (b) This authorization does not constitute any consent required pursuant to the contract clause entitled "Subcontracts" (FAR 52.244-2). Advance notification or requests for consent pursuant to that clause shall be directed to the administrative contracting officer (ACO).
- (c) Pursuant to the contract clause entitled "Government Property (Cost-Reimbursement, Time-and-Material, or Labor-Hour Contracts)" (FAR 52.245-5), title to the property shall vest in the Government.
- (d) Prior to acquisition of any item of Industrial Plant Equipment, the Contractor must comply with the requirements of Department of Defense Federal Acquisition Regulation Supplement (DFARS 245.302-1(b)(1)(A). (See DFARS 245.301 for definition of "Industrial Plant Equipment.")

G-4 SUBCONTRACTORS/CONSULTANTS

- (a) Advance notification or requests for consent pursuant to the contract clause entitled "Subcontracts" (FAR 52.244-2) shall be directed to the cognizant administrative contracting officer (ACO).
- (b) The following subcontractors/consultants have been identified in the Contractor's proposal as necessary for performance of this contract:

Subcontractor/Consultant Name

Estimated Cost

(Paragraph (b) will be included and filled in at time of award if subcontractor/consultants are proposed by the successful offeror)

G-5 NAPS 5252.232-9001 - SUBMISSION OF INVOICES (COST-REIMBURSEMENT, TIME-AND-MATERIALS, LABOR-HOUR, OR FIXED PRICE INCENTIVE (JUL 1992)

- "Invoice" as used in this clause includes contractor requests for interim payments using public vouchers (SF 1034) (a) but does not include contractor requests for progress payments under fixed price incentive contracts.
- The Contractor shall submit invoices and any necessary supporting documentation, in an original and 4 copies, to the contract auditor at the following address:

(*To be completed at time of award*)

unless delivery orders are applicable, in which case invoices will be segregated by individual order and submitted to the address specified in the order. In addition, an information copy shall be submitted to [See Section G for designated COR]. Following verification, the contract auditor will forward the invoice to the designated payment office for payment in the amount determined to be owing, in accordance with the applicable payment (and fee) clause(s) of this contract.

- Invoices requesting interim payments shall be submitted no more than once every two weeks, unless another time period is specified in the Payments clause of this contract. For indefinite delivery type contracts, interim payment invoices shall be submitted no more than once every two weeks for each delivery orders. There shall be a lapse of no more than 30 calendar days between performance and submission of an interim payment invoice.
- In addition to the information identified in the Prompt Payment clause herein, each invoice shall contain the following information, as applicable:
 - (1) Contract line item number (CLIN)
 - (2) Subline item number (SLIN)
 - (3) Accounting Classification Reference Number(ACRN)
 - (4) Payment terms
 - (5) Procuring activity
 - (6) Date supplies provided or services performed
 - (7) Costs incurred and allowable under the contract

	(8) Vessei (e.g., snip, submarine or other craft) or system for which supply/service is provided
(e)	A DD Form 250, "Material Inspection and Receiving Report",
	is required with each invoice submittal.
	is required only with the final invoice.
	is not required.
(f)	A Certificate of Performance
	shall be provided with each invoice submittal.
	is not required.
(α)	The Contractor's final invoice shall be identified as such and shall list all other invoices (if any) previously

- The Contractor's final invoice shall be identified as such, and shall list all other invoices (if any) previously tendered (g) under this contract.
- Cost of performance shall be segregated, accumulated and invoiced to the appropriate ACRN categories to the extent possible. When such segregation of costs by ACRN is not possible for invoices submitted with CLIN/SLINS with more than one ACRN, an allocation ratio shall be established in the same ratio as the obligations cited in the accounting data so that costs are allocated on a proportional basis.

G-6 PAYMENT OF FIXED FEE (COMPLETION FORM)

The fixed fee set forth in Section B of this contract shall be payable on completion of the work and services required under each CLIN of this contract and their acceptance on behalf of the Government. However, the contractor may bill on each voucher the amount of the fixed fee bearing the same percentage to the amount of cost billed as the total fixed fee bears to the total estimated cost set forth in Section B, subject to the contract clause entitled "Fixed Fee" (FAR 52.216-8). If the fixed fee is reduced pursuant to any clause or requirement of this contract and the reduced fee is less than the sum of all fee payments made to the contractor under this contract, the contractor shall repay the difference to the Government. The total fee paid the contractor shall not exceed the fixed fee set forth in Section B.

G-7 INCREMENTAL FUNDING

Pursuant to the Limitation of Funds clause (FAR 52.232-22), the total amount allotted to this contract is \$* and it is estimated that this amount is sufficient for contract performance through *.

(*this provision will be included and completed at time of award, if applicable)

G-8 PAYMENT INSTRUCTIONS FOR MULTIPLE ACCOUNTING CLASSIFICATION CITATIONS (COST-REIMBURSEMENT)

The purpose of these instructions is to permit the paying office to charge the accounting classification citations in the contract in a manner that reflects the performance of the contract. These instructions do not create any obligation on the part of the Government or the contractor nor do they in any way alter any obligation created by any other provision of the contract. Invoices should be paid from available ACRNs in the following order:

- (a) ACRNs cited on the contractor's invoice.
- (b) On a proportional basis from any ACRNs assigned to funds which will cancel at the end of the current fiscal year.
- (c) The ACRN assigned to the following line of accounting: 97X4930.NH4A 000 77777 0 000173 2F 000000 N00173Z45000.
- (d) If funds appropriated in more than one fiscal year are allotted to the contract, the ACRN assigned to the oldest allotment of funds.
- (e) On a proportional basis from all ACRNs assigned to allotments of funds appropriated in a single fiscal year.

SECTION H SPECIAL CONTRACT REQUIREMENTS

H-1 TYPE OF CONTRACT

This is a *

(*To be completed at time of award)

H-2 ONR 5252.237-9705 - KEY PERSONNEL (DEC 88)

- (a) The Contractor agrees to assign to the contract tasks those persons whose resumes were submitted with its proposal and who are necessary to fulfill the requirements of the contract as "key personnel". No substitutions may be made except in accordance with this clause.
- (b) The Contractor understands that during the first ninety (90) days of the contract performance period, no personnel substitutions will be permitted unless these substitutions are unavoidable because of the incumbent's sudden illness, death or termination of employment. In any of these events, the Contractor shall promptly notify the Contracting Officer and provide the information described in paragraph (c) below. After the initial ninety (90) day period the Contractor must submit to the Contracting Officer all proposed substitutions, in writing, at least fifteen (15) days in advance (thirty (30) days if security clearance must be obtained) of any proposed substitution and provide the information required by paragraph (c) below.
- (c) Any request for substitution must include a detailed explanation of the circumstances necessitating the proposed substitution, a resume for the proposed substitute, and any other information requested by the Contracting Officer. Any proposed substitute must have qualifications equal to or superior to the qualifications of the incumbent. The Contracting Officer or his/her authorized representative will evaluate such requests and promptly notify the Contractor of his/her approval or disapproval thereof.
- (d) In the event that any of the identified key personnel cease to perform under the contract and the substitute is disapproved, the contract may be immediately terminated in accordance with the Termination clause of the contract. The following are identified as key personnel: *

(*To be completed at time of award)

H-3 ONR 5252.235-9714 - REPORT PREPARATION (FEB 97)

Scientific or technical reports prepared by the Contractor and deliverable under the terms of this contract will be prepared in accordance with format requirements contained in ANSI/NISO Z39.18-1995, "Scientific and Technical Reports: Elements, Organization, and Design. "[NOTE: ANSI Z39.18 may be obtained from NISO Press Fulfillment Center, P. O. Box 338, Oxon Hill, MD. 20750-0338.Telephone 1-800-282-6476]

H-4 ELECTRONIC AND INFORMATION TECHNOLOGY (EIT)

In accordance with Section 508 of the Rehabilitation Act of 1973 (29 U.S.C. 794d), all EIT supplies and services provided under this contract must comply with the applicable accessibility standards issued by the Architectural and

Transportation Barriers Compliance Board at 36 CFR part 1194 (see FAR Subpart 39.2). Electronic and information technology (EIT) is defined at FAR 2.101.

H-5 OPTION(S)

The Government may require performance of the numbered line items identified in the Schedule as optional items at the price stated in the Schedule. The Contracting Officer may unilaterally exercise the option by written notice to the Contractor anytime prior to the current completion date of the contract. The Government may elect to exercise its option by issuing a new contract for the option. Except as provided in the schedule, the new contract will have the same terms and conditions as this contract including any unexercised options.

H-6 GOVERNMENT-FURNISHED PROPERTY

The following Government property will be furnished to the contractor on a rent-free basis for use in performing the contract:

(To be completed at time of award)

H-7 REPRESENTATIONS AND CERTIFICATIONS

The Contractor's completed Representations, Certifications, and Other Statements of Offerors or Respondents is incorporated herein by reference in any resultant award.

H-8 SUBCONTRACTING PLAN

The contractor's Comprehensive Small Business Subcontracting Plan is incorporated into this contract in accordance with DFARS SUBPART 219.7 *Test Program for Negotiation of Comprehensive Small Business Subcontracting Plans*.

PART II - CONTRACT CLAUSES SECTION I CONTRACT CLAUSES

I-1 52.252-2 - CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.arnet.gov/far

http://heron.nrl.navy.mil/contracts/home.htm

a. FEDERAL ACQUISITION REGULATION CLAUSES

FAR CLAU	SE	TITLE
52.202-1	-	Definitions (DEC 2001)
52.203-3	-	Gratuities (APR 1984)
52.203-5	-	Covenant Against Contingent Fees (APR 1984)
52.203-6	-	Restrictions On Subcontractor Sales To The Government (JUL 1995)
52.203-7	-	Anti-Kickback Procedures (JUL 1995)
52-203-8	-	Cancellation, Rescission, And Recovery Of Funds For Illegal Or Improper Activity (JAN 1997)
52.203-10	-	Price Or Fee Adjustment For Illegal Or Improper Activity (JAN 1997)
52.203-12	-	Limitation On Payments To Influence Certain Federal Transactions (JUN 1997)
52.204-4	-	Printed Or Copied Double-Sided On Recycled Paper (AUG 2000)
52.209-6	-	Protecting The Government's Interest When Subcontracting With Contractors Debarred,
		Suspended, Or Proposed For Debarment (JUL 1995)
52.211-15	-	Defense Priority And Allocation Requirements (SEP 1990)
52.215-2	-	Audit And Records-Negotiation (JUN 1999)
52.215-8	-	Order Of Precedence - Uniform Contract Format (OCT 1997)
52.215-14	-	Integrity Of Unit Prices (OCT 1997)
52.215-17	-	Waiver Of Facilities Capital Cost Of Money (OCT 1997)
		(will be included if the successful offeror does not propose facilities capital cost of money)
52.216-7	-	Allowable Cost And Payment (MAR 2000) (If the contract is with an educational institution,
		modify the clause by deleting from paragraph (a) "Subpart 31.2" and substitute "Subpart
		31.3". If the contract is with a state or local government, delete from paragraph (a)
		"Subpart 31.2" and substitute "Subpart 31.6". If the contract is with a nonprofit other
		than an educational institution, a state or local government, or a nonprofit organization
		exempted under OMB Circular A-122, modify the clause by deleting from paragraph (a)
		"Subpart 31.2" and substituting "Subpart 31.7".)
52.216-8	-	Fixed-Fee (MAR 1997)
52.219-4	-	Notice Of Price Evaluation Preference For HUBZone Small Business Concerns (JAN 1999)
		Offeror elects to waive the evaluation preference.
52.219-9	-	Small Business Subcontracting Plan (OCT 2001) - Alternate II (OCT 2001)

		
52.219-16	-	Liquidated Damages-Subcontracting Plan (JAN 1999)
52.222-2	-	Payment For Overtime Premiums (JUL 1990) -The Use Of Overtime Is Authorized Under This
		Contract If The Overtime Premium Does Not Exceed "O"
52.222-3	-	Convict Labor (AUG 1996)
52.222-19	-	Child Labor – Cooperation With Authorities And Remedies (DEC 2001)
52.222-21	-	Prohibition Of Segregated Facilities (FEB 1999)
52.222-26	-	Equal Opportunity (FEB 1999)
52.222-35	-	Equal Opportunity For Special Disabled Veterans, Veterans Of The Vietnam Era, And Other Eligible Veterans (DEC 2001)
52.222-36	-	Affirmative Action For Workers With Disabilities (JUN 1998)
52.222-37	-	Employment Reports On Special Disabled Veterans, Veterans Of The Vietnam Era, And Other
		Eligible Veterans (DEC 2001)
52.223-6	-	Drug-Free Workplace (MAY 2001)
52.223-14	-	Toxic Chemical Release Reporting (OCT 2000)
52.225-13	_	Restrictions On Certain Foreign Purchases (JUL 2000)
52.227-1	_	Authorization And Consent (JUL 1995)- Alternate I (APR 1984)
52.227-2	_	Notice And Assistance Regarding Patent And Copyright Infringement (AUG 1996)
52.227-11	_	Patent Rights - Retention By The Contractor (Short Form) (JUN 1997)
		(will be included if the successful offeror is a small business or a non-profit organization)
52.227-12	_	Patent Rights - Retention By The Contractor (Long Form) (JAN 1997)
		(will be included if the successful offeror is not a small business or a non-profit organization)
52.228-7	_	Insurance - Liability To Third Persons (MAR 1996)
52.230-2	_	Cost Accounting Standards (APR 1998)
52.230-3	_	Disclosure And Consistency Of Cost Accounting Practices (APR 1998)
52.230-6	_	Administration Of Cost Accounting Standards (NOV 1999)
52.232-9	_	Limitation On Withholding Of Payments (APR 1984)
52.232-17	_	Interest (JUN 1996)
52.232-18	_	Availability Of Funds (APR 1984)
52.232-20	_	Limitation Of Cost (APR 1984) (Applicable when the contract or task order is fully funded)
52.232-22	_	Limitation Of Funds (APR 1984) (Applicable when the contract or task order is not fully
32.232 22		funded)
52.232-23	_	Assignment Of Claims (JAN 1986) Alternate I (APR 1984)
52.232-25	_	Prompt Payment (MAY 2001)
52.232-33	_	Payment By Electronic Funds Transfer-Central Contractor Registration (MAY 1999)
52.233-1	_	Disputes (DEC 1998)
52.233-3	_	Protest After Award (AUG 1996) - Alternate I (JUN 1985)
52.237-3	_	Continuity Of Services (JAN 1991)
52.242-1	_	Notice Of Intent To Disallow Costs (APR 1984)
52.242-3	_	Penalties For Unallowable Costs (MAY 2001)
52.242-4	_	Certification of Final Indirect Costs (JAN 1997)
52.242-13	_	Bankruptcy (JUL 1995)
52.243-2	_	Changes - Cost-Reimbursement (AUG 1987)
52.243-2	_	Changes - Cost-Reimbursement (AUG 1987) - Alternate V (APR 1984)
52.243-6	_	Change Order Accounting (APR 1984)
52.244-2	_	Subcontracts (AUG 1998) - Alternate I (AUG 1998)
52.21.2		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

52.244-5	-	Competition In Subcontracting (DEC 1996)
52.244-6	-	Subcontracts For Commercial Items (DEC 2001)
52.245-5	-	Government Property (Cost-Reimbursement, Time-And-Material, Or Labor-Hour Contracts)
		(JAN 1986) (DEVIATION)
52.245-18	-	Special Test Equipment (FEB 1993)
52.245-19	-	Government Property Furnished "As-Is" (APR 1984)
52.246-23	-	Limitation Of Liability (FEB 1997)
52.246-25	-	Limitation Of Liability - Services (FEB 1997)
52.247-1	-	Commercial Bill Of Lading Notations (APR 1984)
52.247-63	-	Preference For U. S. Flag Carriers (JAN 1997)
52.249-6	-	Termination (Cost-Reimbursement) (SEP 1996)
52.249-14	-	Excusable Delays (APR 1984)
52.252-6	-	Authorized Deviations in Clauses (APR 1984)(fill in Defense Federal Acquisition Regulation
		Supplement (48 CFR Chapter 2))
52.253-1	-	Computer Generated Forms (JAN 1991)

b. DEPARTMENT OF DEFENSE FEDERAL ACQUISITION REGULATION CLAUSES

DFARS CLAUSE		TITLE
252.201-7000	-	Contracting Officer's Representative (DEC 1991)
252.203-7001	-	Prohibition On Persons Convicted Of Fraud Or Other Defense Contract Related Felonies
		(MAR 1999)
252.204-7003	-	Control Of Government Personnel Work Product (APR 1992)
252.204-7004	-	Required Central Contractor Registration (NOV 2001)
252.205-7000	-	Provision Of Information To Cooperative Agreement Holders (DEC 1991)
252.209-7000	-	Acquisition From Subcontractors Subject To On-Site Inspection Under The Intermediate-
		Range Nuclear Forces (INF) Treaty (NOV 1995)
252.209-7004	-	Subcontracting With Firms That Are Owned Or Controlled By The Government Of A Terrorist
		Country (MAR 1998)
252.219-7003	-	Small Business And Small Disadvantaged Business Subcontracting Plan (DoD Contracts) (APR
		1996)
252.219-7004	-	Small, Small Disadvantaged And Women-Owned Small Business Subcontracting Plan (Test
		Program) (JUN 1997)
252.225-7001	-	Buy American Act And Balance Of Payments Program (MAR 1998)
252.225-7002	-	Qualifying Country Sources As Subcontractors (DEC 1991)
252.225-7007	-	Buy American ActTrade Agreements—Balance Of Payments Program (SEP 2001)
252.225-7012	-	Preference For Certain Domestic Commodities (AUG 2000)
252.225-7026	-	Reporting Of Contract Performance Outside The United States (JUN 2000)
252.225-7031	-	Secondary Arab Boycott Of Israel (JUN 1992)
252.227-7000	-	Non Estoppel (OCT 1966)
252.227-7001	-	Release Of Past Infringement (AUG 1984)
252.227-7013	-	Rights In Technical Data Noncommercial Items (NOV 1995) - Alternate I (JUN 1995)
252.227-7014	-	Rights In Noncommercial Computer Software And Noncommercial Computer Software
		Documentation (JUN 1995) - Alternate I (JUN 1995)
252.227-7016	-	Rights In Bid Or Proposal Information (JUN 1995)

252.227-7019	-	Validation Of Asserted RestrictionsComputer Software (JUN 1995)
252.227-7025	-	Limitations On The Use Or Disclosure Of Government-Furnished Information Marked With
		Restrictive Legends (JUN 1995)
252.227-7026	-	Deferred Delivery Of Technical Data Or Computer Software (APR 1988)
252.227-7027	-	Deferred Ordering Of Technical Data Or Computer Software (APR 1988)
252.227-7030	-	Technical DataWithholding Of Payment (MAR 2000)
252.227-7034	-	PatentsSubcontracts (APR 1984)
252.227-7036	-	Declaration Of Technical Data Conformity (JAN 1997)
252.227-7037	-	Validation Of Restrictive Markings On Technical Data (SEP 1999)
252.227-7039	-	PatentsReporting Of Subject Inventions (APR 1990)
252.231-7000	-	Supplemental Cost Principles (DEC 1991)
252.235-7010	-	Acknowledgment Of Support And Disclaimer (MAY 1995)
252.235-7011	-	Final Scientific Or Technical Report (SEP 1999)
252.242-7000	-	Post Award Conference (DEC 1991)
252.242-7004	-	Material Management And Accounting System (DEC 2000)
252.243-7002	-	Requests For Equitable Adjustment (MAR 1998)
252.244-7000	-	Subcontracts For Commercial Items And Commercial Components (DOD Contracts) (MAR
		2000)
252.245-7001	-	Reports Of Government Property (MAY 1994)
252.247-7023	-	Transportation Of Supplies By Sea (MAR 2000)
252.247-7024	-	Notification Of Transportation Of Supplies By Sea (MAR 2000)
		(will be included if the successful offeror made a negative response to the inquiry at
		DFARS 252.247-7022)
252.251-7000	-	Ordering From Government Supply Sources (MAY 1995)

I-2 FAR 52.223-11 - OZONE-DEPLETING SUBSTANCES (MAY 2001)

- (a) *Definitions*. "Ozone-depleting substance", as used in this clause, means any substance the Environmental Protection Agency designates in 40 CFR Part 82 as
 - (1) Class I, including, but not limited to, chlorofluorocarbons, halons, carbon tetrachloride, and methyl chloroform; or
 - (2) Class II, including, but not limited to, hydrochlorofluorocarbons.
- (b) The Contractor shall label products which contain or are manufactured with ozone-depleting substances in the manner and to the extent required by 42 U.S.C. 7671j (b), (c), and (d) and 40 CFR Part 82, Subpart E, as follows: WARNING

Contains (or manufactured with, if applicable) * _____, a substance(s) which harm(s) public health and environment by destroying ozone in the upper atmosphere.

*The Contractor shall insert the name of the substance(s).

1-3 DFARS 252.225-7008 - SUPPLIES TO BE ACCORDED DUTY- FREE ENTRY (MAR 1998)

In accordance with paragraph (b) of the Duty-Free Entry clause of this contract, in addition to duty-free entry for all
qualifying country supplies (end products and components) and all eligible end products subject to applicable trade
agreements (if this contract contains the Buy American Act - Trade Agreements - Balance of Payments Program clause
or the Buy American Act - North American Free Trade Agreement Implementation Act - Balance of Payments
Program clause), the following foreign end products that are neither qualifying country end products nor eligible end
products under a trade agreement, and the following nonqualifying country components, are accorded duty free entry.

PART III - LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS SECTION J LIST OF ATTACHMENTS

- **J-1** Attachment (1) Statement Of Work 7 Pages, With Exhibit A DD Form 1423, Contract Data Requirements List, 2 Pages.
- **J-2** Attachment () Accounting and Appropriation Data- 1 page. *

(* To be included at time of award)

PART IV - REPRESENTATIONS AND INSTRUCTIONS SECTION - K REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS OR RESPONDENTS

K-1 Representations, Certifications, and Other Statements of Offerors or Respondents

Each Offeror must submit a completed Representations, Certifications, and Other Statements Of Offerors or Respondents with its proposal which is available electronically in full text at http://heron.nrl.navy.mil/contracts/reps&certs.htm

K-2 FILL IN FOR FAR 52.219-1 - SMALL BUSINESS PROGRAM REPRESENTATIONS (MAR 2001)

The fill in information is as follows:

The NAICS code for this acquisition is 333314

The small business size standard is. 500 employees

SECTION L INSTRUCTIONS CONDITIONS AND NOTICES TO OFFERORS OR RESPONDENTS

L-1 52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://www.arnet.gov/far http://heron.nrl.navy.mil/contracts/home.htm

FAR CLAUS	E	TITLE
52.204-6	-	Data Universal Numbering System (DUNS) Number (JUNE 1999)
52.214-34	-	Submission Of Offers In The English Language (APR 1991)
52.214-35	-	Submission Of Offers In U.S. Currency (APR 1991)
52.215-1	-	Instructions To Offerors- Competitive Acquisition (MAY 2001)
52.215-16	-	Facilities Capital Cost Of Money (OCT 1997)

L-2 FAR 52.211-14 - NOTICE OF PRIORITY RATING FOR NATIONAL DEFENSE USE (SEP 1990)

Any contract awarded as a result of this solicitation will be a DX rated order; DO rated order certified for national use under the Defense Priorities and Allocations system (DPAS) (15 CFR 700), and the Contractor will be required to follow all of the requirements of this regulation.

L-3 FAR 52.215-20 REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA (OCT 1997)ALTERNATE IV (OCT 1997)

- (a) Submission of cost or pricing data is not required.
- (b) Provide information described below
- (c) See L-13, Volume II Business Proposal

L-4 FAR 52.216-1 - TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a Cost Plus Fixed Fee completion type contract resulting from this solicitation.

L-5 FAR 52.233-2 - SERVICE OF PROTEST (AUG 1996)

- (a) Protests, as defined in Section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO) shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from the Control Desk, Code 3200, Bldg. 222, Rm. 115, Naval Research Laboratory, 4555 Overlook Ave., S.W., Washington DC 20375-5326.
 - (b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

L-6 DFARS 252.227-7017 - IDENTIFICATION AND ASSERTION OF USE, RELEASE, OR DISCLOSURE RESTRICTIONS (JUN 1995)

- (a) The terms used in this provision are defined in following clause or clauses contained in this solicitation—
 - (1) If a successful offeror will be required to deliver technical data, the Rights in Technical Data--Noncommercial Items clause, or, if this solicitation contemplates a contract under the Small Business Innovative Research Program, the Rights in Noncommercial Technical Data and Computer Software--Small Business Innovative Research (SBIR) Program clause.
 - (2) If a successful offeror will not be required to deliver technical data, the Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation clause, or, if this solicitation contemplates a contract under the Small Business Innovative Research Program, the Rights in Noncommercial Technical Data and Computer Software--Small Business Innovative Research (SBIR) Program clause.
- (b) The identification and assertion requirements in this provision apply only to technical data, including computer software documents, or computer software to be delivered with other than unlimited rights. For contracts to be awarded under the Small Business Innovative Research Program, the notification requirements do not apply to technical data or computer software that will be generated under the resulting contract. Notification and identification is not required for restrictions based solely on copyright.
- (c) Offers submitted in response to this solicitation shall identify, to the extent known at the time an offer is submitted to the Government, the technical data or computer software that the Offeror, its subcontractors or suppliers, or potential subcontractors or suppliers, assert should be furnished to the Government with restrictions on use, release, or disclosure.
- (d) The Offeror's assertions, including the assertions of its subcontractors or suppliers or potential subcontractors or suppliers shall be submitted as an attachment to its offer in the following format, dated and signed by an official authorized to contractually obligate the Offeror:

Identification and Assertion of Restrictions on the Government's Use, Release, or Disclosure of Technical Data or Computer Software.

The Offeror asserts for itself, or the persons identified below, that the Government's rights to use, release, or disclose the following technical data or computer software should be restricted:

Technical Data			
Computer Software			Name of Person
to be Furnished	Basis for	Asserted Rights	Asserting
With Restrictions*	Assertion **	Category ***	Restrictions****
(List)****	(List)	(List)	(List)

- * For technical data (other than computer software documentation) pertaining to items, components, or processes developed at private expense, identify both the deliverable technical data and each such items, component, or process. For computer software or computer software documentation identify the software or documentation.
- ** Generally, development at private expense, either exclusively or partially, is the only basis for asserting restrictions. For technical data, other than computer software documentation, development refers to development of the item, component, or process to which the data pertain. The Government's rights in computer software documentation generally may not be restricted. For computer software, development refers to the software. Indicate whether development was accomplished exclusively or partially at private expense. If development was not accomplished at private expense, or for computer software documentation, enter the specific basis for asserting restrictions.
- *** Enter asserted rights category (e.g., government purpose license rights from a prior contract, rights in SBIR data generated under another contract, limited, restricted, or government purpose rights under this or a prior contract, or specially negotiated licenses).
- **** Corporation, individual, or other person, as appropriate.
- **** Enter "none" when all data or software will be submitted without restrictions.

Date	
Printed Name and Title	
Signature	

(End of identification and assertion)

- (e) An offeror's failure to submit, complete, or sign the notification and identification required by paragraph (d) of this provision with its offer may render the offer ineligible for award.
- (f) If the Offeror is awarded a contract, the assertions identified in paragraph (d) of this provision shall be listed in an attachment to that contract. Upon request by the Contracting Officer, the Offeror shall provide sufficient information to enable the Contracting Officer to evaluate any listed assertion.

L-7 GOVERNMENT-FURNISHED PROPERTY

No material, labor, or facilities will be furnished by the Government unless provided for in the solicitation.

L-8 INQUIRIES CONCERNING THE RFP

Any questions concerning the RFP must be submitted in writing to the Contracting Officer at the location noted in blocks 7 and 9 of the Standard Form 33, "Solicitation, Offer and Award," no less than fifteen (15) days before closing. The Government will not consider questions received after this date. Offerors are cautioned against directing any questions concerning this RFP to technical personnel at the Naval Research Laboratory.

L-9 INSTRUCTIONS FOR SUBMISSION AND INFORMATION REQUIRED TO EVALUATE PROPOSALS

- (1) Information for the technical/management proposal shall be placed in Volume I and be completely separate from the business proposal (Volume II).
- (2) Proposal Identification/Mailing The proposal should be packaged for delivery so as to permit safe and timely arrival at destination. The proposal package should be sent to the address shown in Block 7 of the RFP face page and marked:

Solicitation No. N00173-02-R-SE04 Closing Date: (As specified in Block 9, RFP face page) Attn: Code 3235:EJS

(3) Proposal Format and Length - No attempt is made to restrict the proposal format and style. However, the proposal should be written and organized so as to be compatible with the RFP, the Statement of Work, company's organization and accounting structure, and proposed cost estimate. Offerors are encouraged to use recycled paper and maximize the use of double sided copying when preparing responses to solicitations.

L-10 VOLUME I - TECHNICAL/MANAGEMENT PROPOSAL

REQUIRED COPIES: 1 ORIGINAL AND 5 COPIES.

The following information is required for evaluation of your technical/management proposal:

1. QUALITY AND RESPONSIVENESS:

The proposal should demonstrate completeness and responsiveness to the Statement of Work and soundness and clarity in technical explanations. Evaluation of the technical proposal will include ability to meet the primary and secondary requirements factoring the operational environment, demonstrated ability to meet or exceed the stabilization performance, packaging, weight and robustness of design. Modeling to predict performance will be evaluated according to completeness, readability and practical realism. References to technical journal publications may be cited if they relate directly to issues being described in the proposal. References to non-published reports such as from prior contractual efforts or results of IR&D or proprietary efforts may be cited only if copies of such supporting documents are included with the proposal submission.

2. DESIGN AND FABRICATION EXPERIENCE:

The proposal should give a complete description of prior and current endeavors for designing and then either producing or working closely with producers of stabilization systems or units. Proposals should indicate the degree of experience of the company and or of key personnel involved in the design and fabrication process the same or similar systems/units. Identification of agencies or corporations that have tested and used the previous stabilization units shall be included in the proposal as well as references to any open-literature publications summarizing their technology and experience.

3. PAST PERFORMANCE INFORMATION:

- (a) Offerors shall submit the following information as part of their proposal. (Offerors are encouraged to submit the information prior to other parts of the proposal to assist the government in reducing the length of the evaluation period.) List the last three (3) contracts or subcontracts completed by the offeror or predecessor companies during the past three (3) years for services similar in nature to this requirement. Include in the three (3) any current contracts or subcontracts for similar services that were awarded at least one year prior to the date of this solicitation. Offerors that have no similar previous or current contracts should provide the requirement or for the proposed project manager or key personnel responsible for major or critical aspects of the requirement.
 - 1. Name of contracting organization.
 - 2. Contract number
 - 3. Contract type
 - 4. Total contract value
 - 5. Description of the contract work
 - 6. Contracting officer and telephone number
 - 7. Contracting officer's representative, program manager, or similar official and telephone number
- (b) Offerors shall contact the contracting organizations identified pursuant to paragraph (a) as soon as possible and request them to send past performance information on the identified contracts to the address in Block 7 of the face page of this solicitation. The past performance report which is available electronically in full text at http://heron.nrl.navy.mil/contracts/home.htm is to be provided to the contracting organization for this purpose. If the contracting organization has already collected past performance information on the contract pursuant to FAR Subpart 42.15, the format used to collect the information may be used instead of the past performance report.
- (c) Offerors may include in their proposals specific information relating to problems encountered in performing the identified contracts and any corrective actions by the offeror. Offerors should not provide general information on their performance on the identified contracts as this will be obtained from the contracting organizations.

L-11 VOLUME II - BUSINESS PROPOSAL

REQUIRED COPIES: 1 ORIGINAL AND 2 COPIES

(1) COST PROPOSAL

The offeror shall submit a business proposal that includes a cost proposal with supporting information for each cost element consistent with offeror's cost accounting system. The supporting breakdown should include such elements as materials, direct labor, indirect cost, and other costs such as travel. The offeror shall provide exhibits as necessary to substantiate each cost element. Should rates be used in the proposal which are not DCAA approved, the offeror shall provide complete documentation and the rationale for their use at time of proposal submission. However, offerors are advised to use actual labor rates of proposed personnel as the basis for estimating labor costs when practicable.

(2) SMALL BUSINESS PARTICIPATION

(a) In addition to complying with the clause at FAR 52.219-9, Small Business Subcontracting Plan (OCT 2000) with its Alternate II (OCT 2000), proposals must include information to permit evaluation of the extent of participation of small businesses and historical black colleges or universities and minority institutions in performance of the contract. Participation to be identified may be in the form of a joint venture, teaming arrangement, or subcontract. Small business concerns that are not required by FAR 52.219-9 to submit a subcontracting plan must indicate the extent to which proposed joint ventures, teaming arrangements, or subcontracts are with historically black colleges or universities and minority institutions. Information provided should include the extent of participation of such firms in terms of the value of the total acquisition and the complexity and variety of the work such firms are to perform.

SECTION M EVALUATION FACTORS FOR AWARD

M-1 EVALUATION

Award will be made to that offeror whose proposal is determined to be the best value to the Government, proposed cost and other factors considered. The Government reserves the right to make award to other than the low offeror. Although technical considerations are more important than the cost factor, the closer the technical scores of the various proposals are to one another, the more important the business considerations become.

M-2 EVALUATION FACTORS FOR AWARD

Proposals will be evaluated in accordance with the following criteria. The criteria are grouped into two major categories: Technical and Price. The major category, technical, when all factors are combined, is of greater importance than price. Technical proposals will be evaluated in accordance with the criteria stated in Section L.9 and L10. The technical factors are weighted in descending order of importance as listed in Section M.-2-1. Areas within the Offeror's technical proposal that are found to offer unique or innovative designs that provide for performance beyond the Government's minimum requirements as stated in Attachments (1) will receive scores reflecting a rating above acceptable or neutral.

M-2-1. TECHNICAL/MANAGEMENT

(1) DESIGN AND FABRICATION EXPERIENCE:

The proposal should give a complete description of prior and current endeavors for designing and then either producing or working closely with producers of stabilization systems or units. Proposals should indicate the degree of experience of the company and or of key personnel involved in the design and fabrication process the same or similar systems/units. Identification of agencies or corporations that have tested and used the previous stabilization units shall be included in the proposal as well as references to any open-literature publications summarizing their technology and experience

(2) QUALITY AND RESPONSIVENESS

The proposal should demonstrate completeness and responsiveness to the Statement of Work and soundness and clarity in technical explanations. Evaluation of the technical proposal will include ability to meet the primary and secondary requirements factoring the operational environment, demonstrated ability to meet or exceed the stabilization performance, packaging, weight and robustness of design. Modeling to predict performance will be evaluated according to completeness, readability and practical realism. References to technical journal publications may be cited if they relate directly to issues being described in the proposal. References to non published reports such as from prior contractual efforts or results of IR&D or proprietary efforts may be cited only if three copies of such supporting documents are included for government use with the proposal submission.

(3) PAST PERFORMANCE

The proposal will be evaluated on the offeror's demonstrated past performance in the design and manufacturing of adequate stabilization or similar systems. The evaluation shall include basis of the quality of the products, timeliness of performance and delivery, cost controls and business relations. The evaluation will be based on the information provided pursuant to Section L and other sources if available. The evaluation will take into account past performance information regarding predecessor companies, subcontractors that will perform major or critical aspects of the requirement, or the proposed project manager or key personnel responsible for major or critical aspects of the requirement. Offerors that have no relevant performance history or for which past performance information is not available will not be evaluated favorably or unfavorably on past performance. The government may begin proposal evaluation prior to receipt of past performance information. If, after completion of proposal evaluation except evaluation of past performance, the contracting officer determines that evaluation in accordance with FAR 15.304(c)(3)(iv).

M-2-2 COST TO THE GOVERNMENT

Proposed estimated cost to the Government. The Government may adjust the proposed cost for purposes of evaluation based upon an evaluation of cost realism. Cost Realism means that the costs in an offeror's proposal are realistic for the work to be performed; reflect a clear understanding of the requirements; and are consistent with the various elements of the offeror's technical proposal. The cost realism evaluation includes an analysis of the adequacy of the hours, labor mix, and other direct costs to perform the work as proposed in the technical proposal as well as the proposed labor and indirect rates. It also includes evaluation of the likelihood that the risks inherent in the offeror's technical approach will result in higher actual costs than anticipated.

M-2-3 SMALL BUSINESS PARTICIPATION

(a) The extent of participation of small businesses and historically black colleges or universities and minority institutions in performance of the contract will be evaluated on the basis of the proposed extent of participation of such firms in terms of the value of the total acquisition and the complexity and variety of the work such firms are to perform.

M-3 FAR 52.217-5 - EVALUATION OF OPTIONS (JUL 1990)

Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. Evaluation of options will not obligate the Government to exercise the option(s).

DAS STABILIZED POINTING SYSTEM

1.0 General

The Naval Research Laboratory has been tasked to design and oversee assembly of three stabilized infrared cameras. Separate procurements have been established for the optics, stabilization, arrays and processor with the Naval Research Laboratory responsible for defining and overseeing integration. This set of three stabilized infrared cameras will be a prototype for demonstrating the capability of a design for an eight-camera system to be used for searching the 360° infrared horizon around Navy ships at-sea and the ocean surface search when the ship is in or near port. Each camera will have a field of view 48 deg wide by 2 to 3 degrees high, and they will all be separately mounted and stabilized, each looking out through its own infrared window from inside a low radar-cross-section structure high on the ship. It is because of this separate mounting that this new configuration of surveillance system is being called DAS, distributed aperture system.

2.0 Government Furnished Equipment

First a model of the camera payload will be provided with correct shape, weight and center of mass. Then before final test and evaluation of the stabilization units three operative cameras complete with feed-throughs will also be provided. The cameras will be provided as government furnished equipment, and acceptance testing of the stabilization units shall be performed with these GFE cameras integrated as payload by the stabilization contractor. The camera package center of mass will be on the optical axis about 2 to 3 inches behind an approximately 5" entrance aperture, and it is anticipated that this payload will fit in a container approximately 18" long and 9-12" in diameter and weighing 25 to 50 pounds. The electrical feeds across gimbal axes will inflict only minimal resistance to motion, and being inside the ship's low radar-cross section mast structure, the cameras will be protected from wind buffeting.

3.0 Scope

The contract awarded as a result of this solicitation is for the stabilization units. The Contractor shall be responsible for the design, fabrication and delivery of 3 stabilization units and a motion jig for applying test accelerations. Electronic inputs to each stabilization unit shall include the ship's reference gyro and operator controls. Electronic outputs shall include payload pointing angles and drift rates.

As an option, the Contractor shall be responsible for the design, fabrication and delivery of up to four three-axis pointer trackers for directing a super resolution imager of the 5" aperture LIVAR type being developed by Intevac (www.intevac.com). The specific requirements for this option are detailed in Section 12.2.

4.0 Requirements

- 4.1 The primary performance requirement for the stabilized pointing system when the ship is at sea is 360° surveillance using infrared to detect sea skimming missiles within 0.2° of the horizon. Some degree of ocean surface search is needed as well. With the IR cameras tilted and stabilized to have 0.4 deg of elevation coverage above the horizon and 2.0 deg below, users should be able to detect missiles flying as high as 150' above the water and also simultaneously peruse the ocean surface for ships and small boats in to a range of 2kft. Conversely with the cameras canted upward to split 2.0 deg above the horizon and 0.4 deg below, users should be able to detect missiles flying as high as 800' but then be able to peruse the ocean surface in, to only 2 nmi. The stabilized optical center line of sight shall be a remotely controllable parameter that can be operator set anywhere within a range of -5 to +5 deg.
- 4.2 When the ship is in port a much greater elevation scene is needed, -35 to 0 deg or perhaps as much as -35 to +35 deg. This is for detection of nearby small boats or low-performance aircraft, the possible terrorist threat. The only way to achieve this extensive elevation coverage is to use the stabilization system to step the camera through a series of fifteen to thirty elevation-pointing directions and then to use electronics to stitch together a composite large-elevation image. Fortunately the composite image refresh rate can be as slow as several seconds. The requirement for the elevation gimbal torquer, then, is to be able to slew approximately 2.3 deg and to reestablish stabilization both within 1/10 sec. The mode of operation for this in-port case is to repetitively step upward 15 to 30 steps scanning 35 to 70 deg followed by return to the starting direction. The size of the steps do not have to be precise, only the information of what they are so that the processor can correctly stitch together the composite scene. This elevation step panning shall be provided as a mode of operation of the gimbal unit with the maximum up and down excursions to be operator set independently anywhere within the range of +35 to -35 deg.

5.0 Operational Environment

5.1 The Angular Motion Environment: The slow, large-angle motion environment in which the stabilization unit must perform can not be exactly defined in the time frame of this contract. This is because the DAS is being designed for a new class of low radar-cross-section ship currently under development that must be at least partly motion stabilized to prevent large surfaces from tilting too near vertical. It is assumed here, though, that ship roll, pitch and yaw can all be approximated by pure overdamped quasi-sinusoidal motions whose amplitudes and frequencies depend on ship speed, ship heading relative to swell and on sea state. It is also assumed here that the worst-case ship motion environment for DAS will be the same as that of a conventional destroyer-cruiser class ship in sea state 5. Data for worst-case motions of these existing ships are given in Table 1. Ship speed and heading are different for each case tabulated and were chosen to inflict maximum motion response. It will be a working assumption that in a given sea state the amplitude of possible sinusoidal angular motion drops off roughly at six dB/octave both above and below the frequency for maximum motion. Maximum slew rates assuming sinusoidal motion and for sea state 5 are added in the right hand column of Table 1.

Table 1: Destroyer-Cruiser Maximum ± Motions and Periods for sea states 2, 3, 5 & 6, ship speeds 10-20 kts & swell angles of 30°-120°.

Direction	SS2	SS3	SS5	SS6	SS5 Max mR/s
Roll	7.4° @ 6.9s	11° @ 14s	19° @ 11s	28° @ 14s	190
Pitch	.67° @ 2.8s	1.0° @ 5.7s	1.7° @ 7.1s	2.8° @ 7.2s	26
Yaw	.67° @ 7.2s	1.0° @ 14s	1.9° @ 14s	2.7° @ 14s	15
Heave	1.3' @ 14.6s	2' @ 14.6s	3.5' @ 6.3s	6' @ 7.1s	(3.5 ft/s)

Max mRad/sec estimated via sine waves: $\theta_{RollMaxAmp} \sim 19^{\circ} \sin(.57 \text{ t})$, $\theta_{YawMaxAmp} \sim 1.9^{\circ} \sin(.45 \text{ t})$, $\theta_{PitchMaxAmp} \sim 1.7^{\circ} \sin(.89 \text{ t})$.

5.2 The Acceleration Environment:

The DAS system is intended for mounting at a high vantage point some 20 m above the water line. Ship roll is slow but, with such a long lever arm from ship center of mass, will induce significant oscillatory translation acceleration - up to 2g at 0.1 Hz. Cameras will be mounted looking both to the side and fore and aft on the ship, so this roll-induced translation acceleration may be either along or transverse to the payload optical line of sight. Table 2 gives a derived restatement of Table 1 assuming quasi-sinusoidal motions.

Table 2: Maximum Acceleration Amplitudes Derived From Table 1 For 20 m Mast Height.

Direction	SS2	SS3	SS5	SS6
Roll/Pitch/Yaw (*)	6.1 / 3.4 / .51	2.2 / 1.2 / .20	6.2 / 1.3 / 3.8	5.6 / 2.1 / .54
Roll/Pitch (g)	2.2 / 1.2	.79 / .43	2.2 / .47	2.0 / .75
Heave (g)	.081	.12	1.2	1.6

^{*} $deg/sec^2 = (deg) (2p/T)^2$. $g_{R/P} = .0175 (deg/sec^2) 20 / 9.75$, $g_H = (ft/3.28) (2p/T)^2 / 9.75$

5.3 Cryocooler Component Motions:

The cryocooler consists of a twin-opposed balanced compressor, a gas line normally less than 12 inches in length, and a light single-piston displacer or expander inside the dewar cold finger. Total weight of the compressor is significant, 3.2 lb for a 1 Watt cooler, but with the twin opposed balanced pistons it induces negligible vibration or center of mass change. Ideally, the displacer piston movement needs to be along a line running through the crossing point of the gimbal axes so to prevent inertial inducement of angular motions. Even with this alignment, though, displacement of the displacer piston will alter the center of mass position of the camera payload and thereby translate environmentally applied linear acceleration into slight angular acceleration about gimbal axes. The stabilization contractor is to offer suggestions for placement and orientation for these components and shall include effects of counter-reaction forces and center-of-mass shift in stabilization design.

Table 3: Cryocooler Displacer Piston

Displacement	weight	Frequency
0.1 in	1 oz	54 Hz

Compressor uses twin-opposed static balanced pistons.

5.4 Gimbal Feedthrough Resistance:

Only minimal wiring is needed across the gimbal axes. The digital video data rate is approximately 200 kilobits per second and this will be transferred using FibreChannel, OC-24 or probably Gigabit Eithernet. The power requirements for the basic design payload are low consisting primarily of running a cryogenic cooler. The stabilization contractor may choose to either pass through standard 110 volt AC to the power converter of the payload or else to do the power conversion inside the gimbals themselves, both for the stabilization system and the camera payload. It is possible that the payload design power requirement could be as high as 200 watts. The stabilization contractor needs to be aware in determining how the feed-through stiffness for this possible higher power load might affect stabilization design.

Table 4: Gimbal Feed-Through Wiring

	Rating	Size
Power In	10 Watts	2 x 20 G
Signal I/O	GB Eithernet	8-wire ribbon, 26 G

5.5 The Shock Environment:

This is a demonstration system not subject to strict MIL SPEC testing. Shock mounting must, however, be included. The stabilization unit containing payload shall be capable of surviving a fall of two feet onto concrete without damage, and the design analysis shall state the throughput of residual shock to the payload. Shock mounting shall also isolate high frequency vibrations, and design analysis shall describe the drop off of throughput as a function of frequency. The stabilization unit shall lock rotations when not in use or in the event of power failure, and when unlocked be able to withstand at least 90 deg/sec shock against the rotation stops.

5.6 The EMI Environment:

There are no stringent requirements for isolation of electro-magnetic interference for this demonstration hardware. Reasonable precaution should be provided, however, not to be excessively vulnerable to RF radiations of 1 mV/m or to power line surges.

6.0 Required Stabilization Performance

4 (1/40 env)

Roll

6.1. The motion quieting to be achieved by the mechanical stabilization unit is given in Table 6. The sensor elevation and yaw requirements of column one are derived from the condition that motion blurring must be less than one half of the camera's $470x94 \mu Rad$ optical resolution in an integration time as long as 100 mSec^1 and the roll requirement from the condition that the ends of the 2560-detector long array should rotate in this time by no more than half of a detector size. Column two assumes that track times are as long as five seconds, 50 integration times, and that the processor will use the mechanical pointing drift information to correct velocities in it's track files. Column three seeks to waste no more than 10 % of the 512 detectors in elevation or $1 \deg$ of the $48 \deg$ azimuthal field of view.

Table 6: Camera Payload 3s Stabilization Requirements.

The first three rows show the method of determination and the bottom three rows the resultant required specifications numbers.

	Drift	Drift	Position	Position	Stop
Direction	Control	Knowledge*	Control	Knowledge*	Limits
	(mRad/sec)	(mRad/sec)	(mRad)	(mRad)	(deg)
Elevation	.5*.1 mR/.1s	.5*.1mR/3s	.1*50	limited	
Yaw	.5*.5 mR/.1s	1*.45 mR/3s	1 deg	by	
Roll	(.5/1280)/.1s	(.5/1280)/3s	50/1280	mast	
Elevation	.5 (1/350 env)	.02	5 (1/60 env)	flexure	60
Yaw	2.3 (1/6 env)	.15	15 (1/2 env)	to	10

The "env" numbers give comparisons with the "environment" of Table 2.

*Position and drift information are to be provided to the camera's digital video stream for transfer to the warning system processor. Drift information is used to correct track velocity of exceedances. Position information is handed to the ship control center when tracks are declared.

15 (1/20 env)

1 to 2 mRad

30

.2

- 6.2. Ideally, the mechanical stabilization would be so good as to limit motion drift to less than a pixel during an entire track time of 5 sec. For this to be achieved, the "Drift Control" specifications of column one would have to be improved by the factor of 50 and be replaced by the "Knowledge" numbers of column two.² The "Position Control" requirements of column three should be easy to meet or exceed, and in practice are anticipated to essentially match the "Position Knowledge" error due to mast flexure. The offeror should evaluate carefully the additional cost that would be incurred for trying to achieve this better performance and propose accordingly. Offerors may propose different variations of mechanical stabilization based on level of motion drift attained.
- 6.3. Absolute position relative to true vertical is not required for the central processor to do its job of maintaining tracks for many seconds and so is not included as a specification in Table 6. The stabilization unit shall, however, provide camera pointing and roll angles within the accuracy of ship flexure and the ship's gyro reference.

7.0 Mounting

- 7.1. Interface: The basic mounting configuration of the stabilization unit must be designed for a vertical wall with attachment points outside the periphery on an infrared window and with the camera payload looking out through the center of the window.
- 7.2. Motion Jig For Acceleration Testing: A jig or motion platform shall be supplied for applying translation accelerations to the stabilization unit during lab and land testing. A single axis of motion is acceptable provided the stabilization unit can be remounted to be moved perpendicular to any gimbal axis. At least 0.1 g of acceleration is needed as with >25 cm of sinusoidal linear travel back and forth at <0.3 Hz.
- 8.0. Electrical Interfaces:
- 8.1. The ship's gyro reference may be used for input. Outputs shall be relayed via the camera's digital stream to the central processor and shall include position and position drift information for the three axes.
- 8.2. Null Ship Gyro Reference Simulator: The stabilization unit shall be able to lock its ship gyro inputs to operator assigned fixed values during land testing.

9.0. Schedule

The objective is to reach Critical Design Review by January, 2003, and complete production and testing of the first stabilization unit by April, 2003.

10.0. Integration Responsibility:

The stabilization contractor shall make recommendations concerning payload packaging, mass stabilization and gimbal feed-throughs. A model of the payload may be used initially for stabilization test and evaluation. The stabilization contractor is responsible for mechanically integrating the operative camera payloads into each of three stabilization units.

11.0. Deliverables

11.1. Document Deliverables: The Contractor shall deliver the following as set forth below and in accordance with Exhibit A, Contract Data Requirements List.

Monthly Progress Reports: Provide a one-page summary of work progress and funds expenditures. Compare to planned schedule and describe impact if any on milestone completion dates. 3 copies Summary of Approach: Provide a brief description with draft drawings of the stabilization unit. Anticipated 2 months from date of award. 3 copies

Preliminary Design Drawings: Provide briefing materials and preliminary drawings of the stabilization unit plus schedule for completion of design and fabrication. Anticipated due date of September, 2002. 3 copies

Critical Design Drawings: Provide briefing materials and preliminary drawings of the stabilization unit, description of materials and machining availability, schedule for fabrication and a plan for performance testing. Anticipated due date of January, 2003. 3 copies

Performance Test Results: Provide written report of stabilization performance testing. Anticipated due date of April, 2003. 3 copies

11.2 Hardware Deliverables:

Three stabilization units, each holding one GFE camera. One motion-mount rig for stressing and testing stabilization performance.

12.0 Options:

- 12.1 The Contractor shall provide up to 15 additional Stabilization Units in lots of 5 and 8 each. The Contractor shall provide the units within 12 months of exercise of the option or sooner. (See Section F-3)
- 12.2 Optional Three-Axis Pointer Trackers. The main cameras described in the opening paragraphs of this SOW will be used as acquisition devices for cueing the super-resolution Intevac imager, that is, for sluing a pointer-tracker to be delivered under this option. These pointer trackers are less sophisticated than the main stabilized gimbals being purchased in this acquisition. The roll and yaw axes of these pointer trackers are to be directed by pointing signals derived from imagery and are not to be closed loop driven by error signals derived from self-contained gyroscopes. Encoders or resolvers to read axis angle are thus sufficient. Resolution is now $10\,\mu\text{Rad}$, however, and gain and bandwidth of the torquers needs to be sufficient to achieve steady imagery for operator viewing when the ship is in low sea state of two or less. Only the inner roll axis is to be closed loop, and this only loosely. For operator viewing of 512x512 imagery the roll drift needs to be within $1/256 = 4\,\text{mRad/sec}$ with bubble reference sufficient for roll angle positioning. Control signals from and to the pointer tracker are again to be digitally buffered for inclusion in the Intevac imager digital video stream.

Well capacity is defined as the charge filling at which non-linearity begins, and wells are usually filled to some 2/3 this level or about 10 million carriers. For a hot 100F background the needed integration time to accumulate this charge is about 15 mSec, and solar loading may shorten this to 10 mSec or less. But the stabilization needs to be sufficient for the sensor to operate in cold 32F backgrounds in which case it takes up to 100 mSec to accumulate the charge limit. (F2.5 optics, e_{cs} =.75, 23µmx23µm active area detector area with e_{qe} =.75, and spectral band either 4.6-4.8µm or 3.8-4.2µm.)

²This might be achievable because low-cost gyros generally have a stability of 1 deg/hr = 5 µRad/sec. Navigation gyros are 100 times better but probably too expensive for DAS.

CONTRACT DATA REQUIREMENTS LIST

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